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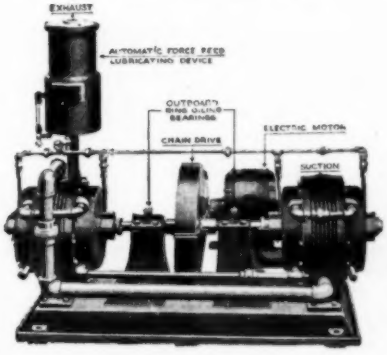

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OIL & FAT INDUSTRIES

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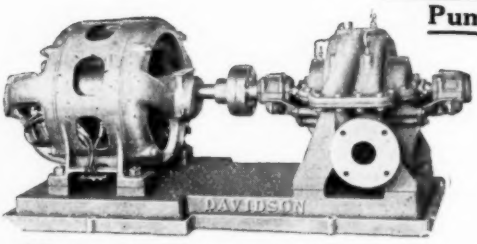

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OIL & FAT INDUSTRIES

VOLUME V NOVEMBER, 1928 NUMBER 11

ANNOUNCEMENT!

EFFECTIVE November first, OIL & FAT INDUSTRIES has been taken over by the MacNair-Dorland Company of New York from Russell Palmer, former owner and publisher. Until January there will be no radical changes in the content or make-up of the publication. It will continue to act as official journal for the American Oil Chemists' Society and to serve the technical men of the fat and oil producers and refiners as it has in the past. Alan Porter Lee, well-known in technical circles of the oil and fat industry, has joined the MacNair-Dorland organization and will continue as editor of the publication.

During the next month, arrangements will be completed to make a number of improvements in OIL & FAT INDUSTRIES. The size of the publication will be increased very materially and the editorial content will be expanded to embrace commercial and business subjects. At the same time, the scope of the technical subjects will be broadened and their number increased. Likewise, a greater number of ramifications of the oil and fat industries will receive editorial consideration, particularly with reference to the edible oils and fats and food products made directly from them.

OIL & FAT INDUSTRIES has been taken over by an experienced publishing organization, the present publishers of *Soap* and the *American Ink Maker*. The new owners will strive in every way to make the publication of real value and interest to every producer and refiner of oils, fats and edible oil products and to be of genuine service to these industries. Its advertising pages will be clean and informative, and will warrant confidence. In all, OIL & FAT INDUSTRIES will aim to be a progressive, modern magazine, standing ready at all times to act in the best interests of the manufacturers it serves.

MacNair-Dorland Company,
Publishers.

Oil Chemists' Society Meets in New York

Second Fall Meeting Accomplishes Formation of Section Devoted to Soap Chemistry

THE second Fall meeting of The American Oil Chemists' Society was called to order in the Board of Managers' room of the New York Produce Exchange at 10 A. M. October 25, with a large and enthusiastic attendance of members and visitors.

Mr. H. P. Trevithick, Past President of the Society, introduced President Beatty of The New York Produce Exchange, who welcomed the Society to New York and to the Exchange, and extended an invitation to all present to have luncheon in the Produce Exchange Luncheon Club as guests of the Exchange. The complete text of Mr. Beatty's address follows:

"FRIENDS OF THE AMERICAN OIL CHEMISTS' SOCIETY: In the name of the members of the New York Produce Exchange, as well as of myself, it is a pleasure to greet and welcome you to this Exchange. We are glad you have come and we hope while here you will be able to see something of this city of ours.

The Oil Industry is something about which I have little knowledge. It is entirely foreign to my line of business, as I am a grain man, but since becoming President of this Honored Institution, it has been gratifying to be in touch with the Cotton Seed Oil Futures Market and learn something of its workings.

While I understand your Society is not very old as years go, your organization covers a wide field and has proven its worth by its rapid growth. We are pleased to have a voice in your Association through our own Chief Chemist, Mr. Trevithick. The New York Produce Exchange values this Association so much that our rules require that the methods of the American Oil Chemists Society, as published in the Interstate rule book, must be followed, wherever applicable, by our Bureau of Chemistry. Further the Chief Chemist of our Bureau of Chemistry, Mr. Trevithick, is an official referee chemist of the Interstate Association and a past president of your Society, and this Exchange has manifested its interest in the Society by having its Chief Chemist present at your annual meetings. This special group, I believe, is particularly interested in the soap end of this business and this will appeal to those of our members who are buying and selling the products to be made into this useful article, but which in our younger days many of us had no liking for. We hope our Trade will reap benefit from the personal contacts and friendships formed through your friendly association with our members, and we in turn want you to derive corresponding benefit by your holding your convention here. Altogether, I believe, you will have much in common to discuss concerning your great industry as a whole and particularly in the analysis of cotton oil. We are glad to give you a cordial welcome."

The program of the meeting was outlined by Mr. Trevithick, who then relinquished the Chair to Mr.

Putland, the President of the Society.

Reports of Committees were read, following which a paper on Olive Oil was presented by Sidney Musher, of The Pompeian Corporation, Baltimore, Md.

Dr. R. B. Trusler, Fellow of the Mellon Institute, presented a very interesting paper on "Soaps from Organic Bases" in which he discussed in some detail the properties and preparation of soaps from triethanolamine. This paper will be reported in full in an early issue of OIL & FAT INDUSTRIES.

A paper on "Metallic Soaps" was read by M. F. Lauro, of the New York Produce Exchange Laboratories.

Mr. A. K. Church of Lever Bros, next spoke on the "Need of a Soap Section" and outlined several ways in which a soap section could begin a program of activity. It was requested that those interested in the formation of a soap section meet in the afternoon for discussion.

A discussion of the "Fundamental Relation of the Problems of the Margarine Industry to those of the Oil Chemists" was presented by Dr. J. S. Abbott, secretary of the Institute of Margarine Manufacturers.

Dr. W. D. Richardson announced a meeting of the Committee on the Analysis of Commercial Fats and Oils for Friday, after the morning session.

Mr. Morrison spoke briefly in favor of the formation of a soap section.

Mr. Herman Aspegren called attention to some discrepancies in the rules for action of the Governing Committee.

Mr. Putland called upon the members present to make themselves better acquainted with each other by rising in turn and announcing their names and business connections.

The business meeting was then adjourned and all present repaired to the Produce Exchange Luncheon Club, where a most enjoyable luncheon was served. Mr. John Murray, Chairman of the Cottonseed Oil Committee of the New York Produce Exchange, made a short talk at luncheon, explaining the working of the futures trading in cottonseed oil on the Exchange market, then the members and guests were taken to the floor of the Exchange where they had an opportunity to witness the trading in actual operation.

The second day's meeting was held in the Colonial Room of the McAlpin Hotel, and was called to order by President Putland at 10:00 A. M.

The first paper for the day was presented by Prof. A. W. Thomas of Columbia University on the Subject of "Gibb's Law of Absorption and its Significance in Emulsions, Froths and Foams."

"The Use of Fats in Baking" was the subject of the next paper by Dr. M. B. Graff. This paper was read by Mr. Morrison in the absence of Dr. Graff.

Mr. S. N. Cummings of the Pylam Products Co. addressed the Society on the subject of "Coloring Soaps".

A paper on the "Spontaneous Heating of Oils and Fats" was read by Mr. N. J. Thompson of the Associated Factory Mutual Fire Insurance Companies.

The meeting was adjourned at 1:15 P. M. until 2:30 P. M.

The meeting was called to order at 2:30 P.M. and the first paper was presented by Dr. Judd of the Bureau of Standards, which was a report of the results of the color

vision tests made at New Orleans.

"Reports of Some Mackey Tests of Vegetable Oils" was the subject of a paper read by Mr. Herman Aspegren of the Portsmouth Cotton Oil Refining Corporation.

A paper by A. P. Lee and John E. Rutzler, Jr., describing some of the properties of alkaline earth stearates was read by Mr. Rutzler.

Mr. Putland anounced that Mr. A. K. Church had been selected as Chairman of the Soap Section.

Before adjournment, the following Resolution was adopted:

Whereas, the New York Produce Exchange, and particularly its President, Mr. William Beatty, and the Chairman of the Cotton Seed Oil Committee, Mr. John Murray, have been most courteous and considerate in entertaining our Society, be it resolved that the thanks of the Society be extended to Mr. Beatty and Mr. Murray and to the Exchange.

The following were present:

A. W. Putland, Portsmouth Cotton Oil Refining Corp.; H. P. Trevithick, N. Y. Produce Exchange; Jacob Wolfson, National Oil Products Co.; F. DeLeouw, Lucidol Corp.; Dr. J. S. Abbott, Institute of Margarine Mfrs.; Sidney Musher, Pompeian Corp.; E. T. Marceau, Gold Dust Corp.; A. W. Krebs, Chemical Engineer, J. E. Rutzler, Jr., Pilot Lab.; A. H. Salomon, I. A. Salomon & Bro.; W. A. Peterson, Kirkman & Son; R. M. Sharlach, Soap Gazette & Perfumer; J. G. Vail, Philadelphia Quartz Co.; M. L. Sheely, Armour Soap Works; D. S. Collard, Metasap Chemical Co.; H. M. Dickinson, Swan & Finch Co.; Arthur Delafontaine, Corn Products Refining Co.; L. F. Hoyt, Larkin Co.; J. J. Vollertson, Armour & Co.; H. J. Morrison, Procter & Gamble Co.; A. K. Church, Lever Bros. Co.; J. M. Lubit, Flash Chemical Co.; C. F. Kaegebehn, R. T. Vanderbilt Co.; Miss Rosalind U. Norris, Postum Co.; R. C. Hatter, Van Camp Pkg. Co.; Francis M. Turner, Oil Process Co.; M. Doniger, National Lead Co.; R. B. Trusler, Mellon Institute; C. J. Gundel, Fels & Co.; R. M. Miller, A. H. Thomas Co.; A. G. Stern, Colgate-Palmolive-Peet Co.; David Wesson, Wesson Oil Co.; M. F. Lauro, N. Y. Produce Exchange; W. D. Richardson, Swift & Co.; A. A. Jackson, Glidden Food Products Co.; W. H. Irwin, Swift & Co.; Alan Porter Lee, Oil and Fat Industries; W. H. Dickhart, N. Y. Produce Exchange; M. Kuelman, N. Y. Produce Exchange; H. V. Cadwell, Central Scientific Co.; Herman Aspegren, Portsmouth Cotton Oil Refining Corp.; B. Morey, Larkin Co., Inc.; A. J. Redpar, Consulting Chemist; L. M. Tolman, United Organic Chemical Co.; J. M. Wilson, Gold Dust Corp.; L. C. Whiton, Edouard Bataille; N. J. Thompson, Assoc. Fact. Mutual Labs.; Dr. Deane B. Judd, U. S. Bureau of Standards; J. W. Hegeman, Lever Bros. Co.; R. R. Gibson, C. P. R. Co.; Wm. E. Brady, C. P. R. Co.; Edward J. Emmer, J. B. Dewsnap; W. E. Anderson, Yale Univ.; J. E. Egan, Procter & Gamble Co.; Dr. A. W. Thomas, Columbia Univ.; R. W. Perry, Gunns, Ltd.; C. J. Kenlan and S. M. Williams, National Oil Products Co.; Alfred Garrigues, Manhattan Soap Co.; P. M. Wiswall, Postum Co.; A. R. McQuillan, Houchin-Aiken Co.; D. Jorysch, H. Kohnstamm & Co.; J. R. C. Boyer, Jr., Boyer Oil Co.; S. W. Cummings, Pylam Products Co.; C. L. Turner, Factory Mutual Insurance Co.; G. H. Bankes, Swan & Finch Co.; G. M. Holbrook, Armour & Co.; Ira P. MacNair Wayne E. Dorland, *Soap.*

Soap Chemists Organize Section

A. K. Church Chosen to Direct Activities of Important Subsidiary of A. O. C. S.

ON the afternoon of October 25, a group of chemists particularly interested in the Chemistry of oils and fats as applied to the manufacture of soap and other detergents and the recovery of, and development of uses for glycerin, met in the Board of Managers' room of the New York Produce Exchange to discuss the formation of a Soap Chemistry Section of the American Oil Chemists' Society.

Mr. A. K. Church opened the meeting with an outline of the ways in which a Soap Section could begin activities, with a simple program of work along the following lines:

1. Improvement of some of the analytical methods pertaining to soap, an instance of which is the determination of the titer of fatty acids through the use of a thermocouple.

2. The preparation of a standard soap sample for the purpose of checking analytical results as between different laboratories.

3. The preparation of a standard glycerin sample for the same purpose.

4. The certification of commercial laboratories as referees on soap and glycerin analysis.

A general discussion of the plan followed, in which approval was voiced by practically all present.

A vote was taken on the desire of the members present to form a soap section, the result being unanimously in favor thereof.

A vote taken on the advisability of starting activity with the preparation of a standard sample of soap and also a standard sample of crude glycerin, was carried in favor of so doing.

A. K. CHURCH

It was voted to suggest to the Governing Committee of The American Oil Chemists' Society, the names of several members from whom a Chairman of the Soap Section might be selected.

Mr. A. K. Church, of Lever Bros. Co. and Mr. H. J. Morrison of The Procter and Gamble Co. were nominated and seconded. The Governing Committee, announced at the next day's meeting of the Society, that they had appointed Mr. Church as Chairman of the Soap Section.

The members present were:

H. J. Morrison (P & G); A. J. Stern (Colgate); J. M. Lubit (Flash); L. F. Hoyt (Larkin); B. Morey (Larkin); M. L. Sheely (Armour); A. K. Church (Lever); W. A. Peterson (Kirkman); J. E. Rutzler (Pilot Lab.); A. P. Lee (O. & F. Ind.); C. J. Gundel (Fels); R. B. Trusler (Mellon Inst.)

Mayonnaise Manufacturers Convene in Boston

Co-operation and Quality Stressed at Annual Meeting of Producers' Association

MAINTAINING splendidly their enviable past record for friendly cooperation between competitors for the purpose of advancing the business methods and quality of product of their industry as a whole, the Mayonnaise Products Manufacturers assembled in annual convention at the Copley-Plaza Hotel in Boston, October 29th to 31st, inclusive. The attendance was large and enthusiastic and bore witness to the rapid progress which the mayonnaise industry is making in this country.

C. P. McCORMICK
President Mayonnaise Mfrs. Assoc.

The members of the Association were welcomed to Boston by Mrs. Nina M. Gevalt, Election Commissioner of the city. The feature of the first day's session, after committee reports were received, was the address of the Association's president, Mr. C. P. McCormick, of McCormick and Co., Baltimore, Md. President McCormick reviewed the progress of the industry to date, showing that the manufacturers of mayonnaise had been so successful in selling the idea of their products to the public, that the industry has grown within ten years to a volume of $70,000,000 and now ranks among the leading food industries. He also discussed the relations of the industry with chain-stores and other volume buyers and stressed the importance of price maintenance for the preservation of high standards of quality.

Dr. F. C. Blanck, of the United States Department of Agriculture addressed the Association on the subject of "Research and the Mayonnaise Industry" outlining the value of true chemical research to modern industry and to mayonnaise producers particularly. Dr. Blanck quoted Roger W. Babson to the effect that "the two best salesmen today are a 'better product' and a 'cheaper way of making it.' "

Other speakers who addressed the meetings were, Dr. David Wesson, A. E. Rouse, Jr., B. S. Pearsall and E. H. Farmer.

A dinner was tendered the Association on Monday evening by James A. Aicarda and Sons Co. and on Tuesday evening the annual banquet was held.

The officers chosen for the coming year were as follows:

President: C. P. McCormick, Baltimore, Md. V.-P.: E. P. Kelly, Columbus, O. Sec.-Treas.: Anna Schlorer Smith, Philadelphia, Pa.

The Spontaneous Heating of Oils*

Describing a New Modification of the Mackey Testing Machine

BY NORMAN J. THOMPSON †

A PRELIMINARY consideration of this subject suggested the use of rapid chemical methods for determining the tendency of oils to oxidize at normal temperatures. It was realized that the iodine number does not indicate the extent or the rate of oxidation, except in a general way. Raw linseed oil, for example, has a higher number than boiled linseed oil; the latter, however, has a much greater tendency to oxidize under ordinary conditions. Furthermore, neat's-foot oil (Iodine Number 77), lard oil (Iodine Number 95), and olive oil (Iodine Number 91), will all show very much greater heating tendencies than castor oil or sperm oil whose iodine numbers are approximately 88. It has been thought in the past that an oil having an iodine number less than 100 was free from spontaneous heating. However, olive oil, with oxidation once begun, and showing a low iodine number (80 to 85), will have much greater tendency to heat spontaneously than would a pure corn oil (Iodine Number 125).

Apparatus for Testing Heating of Oils on Cotton

It was thought that an ideal way of indicating the spontaneous heating of oils would be to measure directly the oxygen absorbed during the heating, since the latter is essentially an oxidation reaction. Consequently, a bottle made of brass was designed to be used immersed in a bath of boiling water during tests. The bottle was closed by a rubber stopper in which were inserted sensitive thermometers and suitable connections for the determination of oxygen absorption by decrease in pressure. The apparatus was so designed that either air or oxygen could be admitted. When samples such as cottonseed oil, or oils of even greater heating tendencies were tested in this apparatus, it was found that the oxygen absorbed in a definite length of time was closely proportional to the heating rates as determined in other ways. However, when testing oils such as castor oil and mixtures of cottonseed and mineral oil, it was found that instead of a gas absorption there was an increase in pressure. This increase is due to the vapor pressure of the oil or its products of oxidation, and

* Presented at Second Fall Meeting, American Oil Chemists Society.

† *Factory Mutual Laboratories, Boston, Mass.*

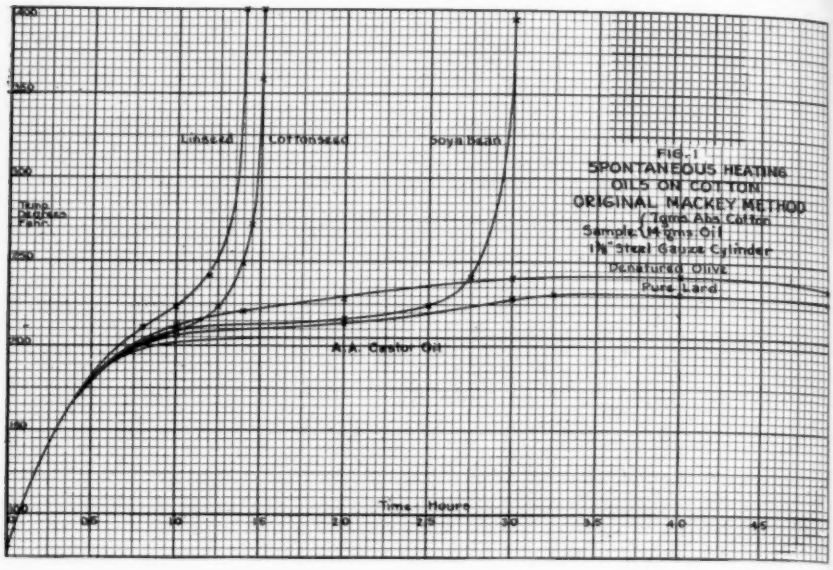

Fig. 1

is great enough at temperatures above 200°F. to make unreliable any figures obtained. Since we are most interested in the oils whose heating tendencies lie between that of castor oil and such oils as cottonseed, this oxygen absorption method proved to be quite disappointing.

Other Chemical Methods

Another chemical method which was tried made use of chromic acid as the oxidant. This acid was tried in aqueous solution alone and also with the addition of a small amount of chloroform, placing the chromic acid solution in a shallow dish of large diameter, such as a crystallizing dish, and then carefully pouring the oil to be tested over the aqueous solution. It was thought that with this arrangement where the surfaces in contact would be always the same and where temperature conditions could be carefully regulated, very consistent results could be obtained. Without the chloroform, however, the action of the chromic acid was very slow unless the solution was made quite hot, which resulted in considerable movement of the surfaces and consequent inconsistent results; and with chloroform added, the latter was oxidized to some extent as well as the oil being tested so that unreliable figures were again obtained.

Not being much encouraged by any chemical procedure, attention was given to methods of testing by actual measurement of temperature produced. The apparatus known as the "Ordway" consists entirely of a light steel tube about 4 in. in diameter in which were placed two 50-gram balls of cotton, one being oiled with an equal weight of the oil under test, and the other being left unoiled as a blank. The two balls of cotton were placed approximatly 12 in. apart and heated by an external air bath surrounding the 4 in. tube. Small holes in the ends of the air bath allowed a supply

of fresh air to reach the sample. With the heating medium so arranged as to heat the balls of cotton equally, the blank was brought up to 212°F. and held there throughout the test. It has been customary to consider that a sample which heated to 300°F. within two or three hours would be dangerous under favorable conditions. It was extremely difficult to duplicate results with this apparatus and the operator must use more than ordinary care to prevent overheating the test sample.

The Mackey Apparatus

The apparatus which is in most general use today was devised by William Mackey, and is manufactured by Reynolds and Branson, Ltd., Leeds, England. This apparatus is essentially a jacketed cylinder 4 in. in diameter and 7 in. in height, closed at the top by a cover with a center hole to accommodate a thermometer, and having two draft tubes, each approximately 6 in. in length and ½ in. in diameter. One of these draft tubes extends down into the cylinder, and the other extends upwards from the cover. The procedure originally recommended for the Mackey apparatus calls for a sample consisting of seven grams of absorbent cotton carrying fourteen grams of the oil to be tested. The sample is placed in a wire gauze cylinder about 1⅜ in. in diameter and 6 in. long, the cylinder being held concentrically in the apparatus by a projection on the inside of the jacketed vessel. The customary procedure is to bring the water bath to boiling, insert the sample into the apparatus, and then take readings of the thermometer at frequent intervals. If the temperature does not exceed 100°C. within an hour, or 200°C. within two hours, the oil is considered safe as far as its tendency for spontaneous heating is concerned.

Several tests were made with the Mackey apparatus according to di-

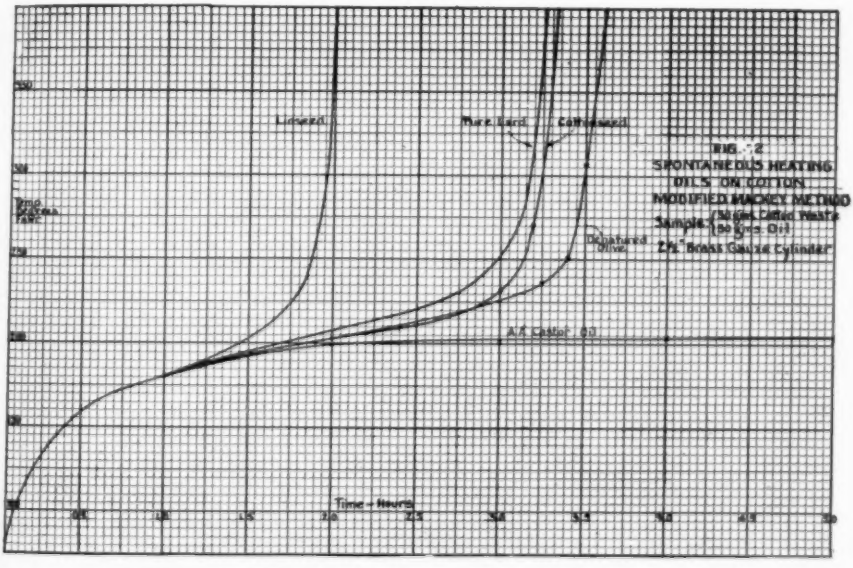

Fig. 2

rections. It was found that oils such as linseed, cottonseed, and the fish oils would heat, but other oils also known to be dangerous such as corn, oil, soya bean oil, denatured olive oil, red oil, and pure lard oil did not exceed 100°C. within two hours. Samples of these same oils tested under favorable conditions were found to heat quite readily.

thirty grams of clean cotton waste, into which had been worked an equal weight of oil under test. By increasing the sample size, the heat loss to the surroundings is not appreciably changed, but the heat available for raising the temperature of the sample itself is considerably increased. Of course, with a larger sample a longer time

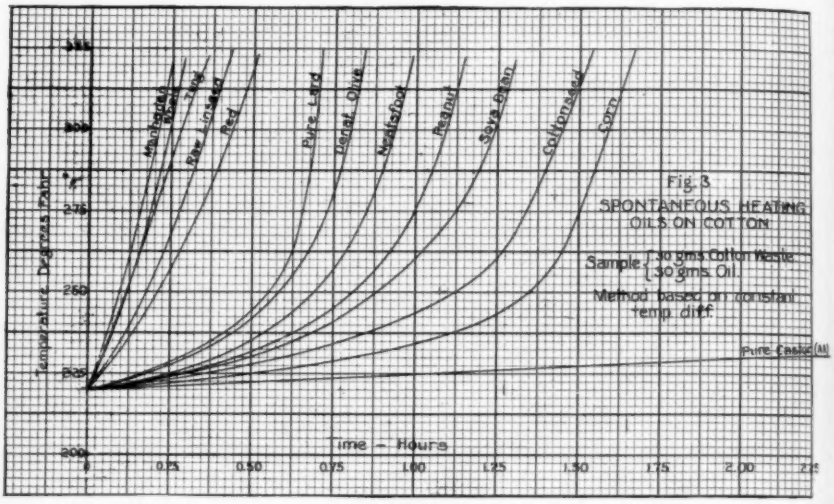

Fig. 3

A few test results obtained by the original Mackey method are shown in Fig. 1. It will be noted that according to this method there appears to be little difference in the heating of linseed and cottonseed oil; also that cottonseed oil is widely separated from denatured olive oil and pure lard oil. No such characteristics as these are evidenced by practical experience. Therefore, an attempt was made to modify this method so as to duplicate in greater measure conditions which might exist in practice where it is usually necessary to consider the heat-insulating effect of a large mass of material. Consequently, a larger sample was chosen, using

is required to heat it artificially to the test temperature; and also it requires a little more time for oxygen to penetrate into the center of the sample. The curves in Fig. 2 show some results obtained by this modified Mackey method. It will be noted that cottonseed oil, denatured olive oil, and pure lard oil are now grouped closely together, but that these three oils are all widely separated from raw linseed oil. Another point of interest is the fact that pure lard oil evidences a greater heating tendency than cottonseed, although in the original Mackey method these results were reversed. A theoretical explanation for this peculiar reversal of results

is that lard oil has a greater initial rate of oxidation, but the oxidation of cottonseed oil is increased more on account of the catalytic action of the products of its oxidation.

Modification of the Tester

In an endeavor to stimulate as closely as possible practical conditions where large quantities of material may be stored, an apparatus was designed so that the surroundings of the sample under test could be made to follow it in temperature by any desired lag. This apparatus consisted of a steel tube 2½ inches inside diameter and 12 inches in length, the tube being jacketed by an oil bath, except for an inch on either end. The apparatus was designed so that the tube could be placed horizontally and caps were provided for each end of the tube, in which were drilled nine 3/16 in. holes. In this apparatus, by the use of the oil bath, almost any desired temperature can be maintained quite easily by the use of a Bunsen flame. Furthermore, the air supply is entirely adequate for any oxidation requirements of a sample of oiled cotton up to thirty grams. The method followed in using this apparatus was to heat

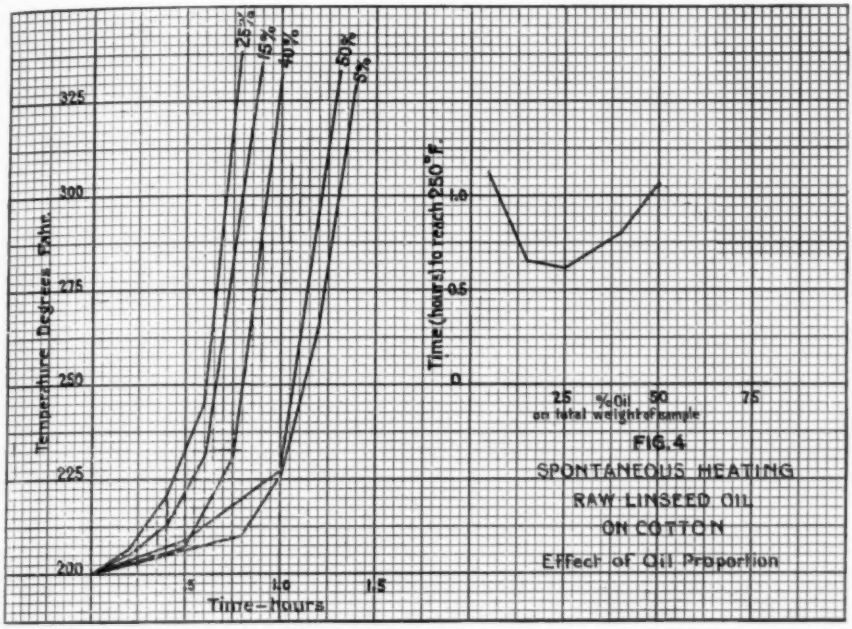

Fig. 4

the oil bath to the test temperature, then insert the sample in the center of the steel tube, allowing the sample to come up rapidly to the temperature of the bath. A thermometer was, of course, placed in the center of the sample. In giving results, time was reckoned from the moment the sample reached the test temperature.

Testing Procedure

For most work, the test temperature chosen was 220°F. It

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What it will offer the Reader

A CONTINUANCE of the unusual technical service, under the auspices of the American Oil Chemists' Society, that has won a real place for OIL & FAT INDUSTRIES among the technical men in the field, coupled with a modern business paper editorial policy.

The editorial section of the publication will be materially enlarged to accommodate feature articles for the executive, purchasing department, packaging engineer, etc., news in abundance, market information, trade-mark and patent developments, etc.

Edible food product producers, manufacturers of mayonnaise, salad oils, lard and lard compounds, margarins, etc., as well as fat and oil producers and refiners, will find a well grounded all 'round publication in the new OIL & FAT INDUSTRIES, one which will serve all branches of the industry equally well.

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edible products**

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THROUGH one medium practically complete coverage of North and South American producers and refiners of oils and fats and manufacturers of all edible oil products, such as margarins, salad oils, mayonnaise, lard, lard compounds, etc.

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MAC NAIR–DORLAND COMPANY, INC.

PUBLISHERS

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Publishers of SOAP

SOAP BLUE BOOK AMERICAN INK MAKER

was thought that the apparatus might later be used in general test work and, as samples might sometimes contain water, it was desired to have relative figures for comparison at bath temperatures which would allow rapid evaporation of moisture. In operating the apparatus, a sample was placed in the tube after the bath had reached the test temperature, this bath temperature then being maintained constant until the temperature of the sample exceeded it by 3°F. From this time on, the bath temperature was kept 3°F. below that of the sample until the latter began to heat much more rapidly, when this difference could be increased gradually to a maximum of about 12°F. for a heating rate approximating 5°F. per minute.

Fig. 3 shows test results of several commercial oils of high purity when tested according to this experimental method. It will be noted on consideration of the curves that pure lard oil and denatured olive oil both heat more rapidly than cottonseed oil. It is also interesting to note that pure castor oil will heat spontaneously in this apparatus, although there is no evidence of any increase in its rate of oxidation during the test period shown.

Using the new test method based on the constant temperature difference between the sample and its surroundings, a series of tests were made to determine the effects of factors which are apt to vary considerably in practice, such as oil proportion, moisture content, temperature, age or condition of the oil, presence of metallic oxides, dilution by mineral oils, and the addition of negative catalysts.

The next figure (No. 4) shows what happened when the ratio of weight of oil to weight of cotton was varied. In these tests, the heating rate increased up to 25% of oil and then decreased up to

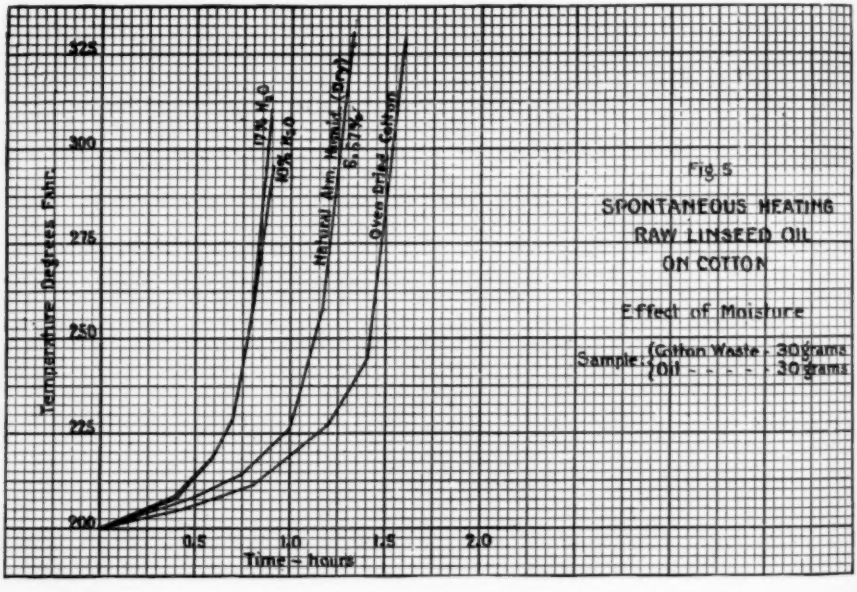

Fig. 5

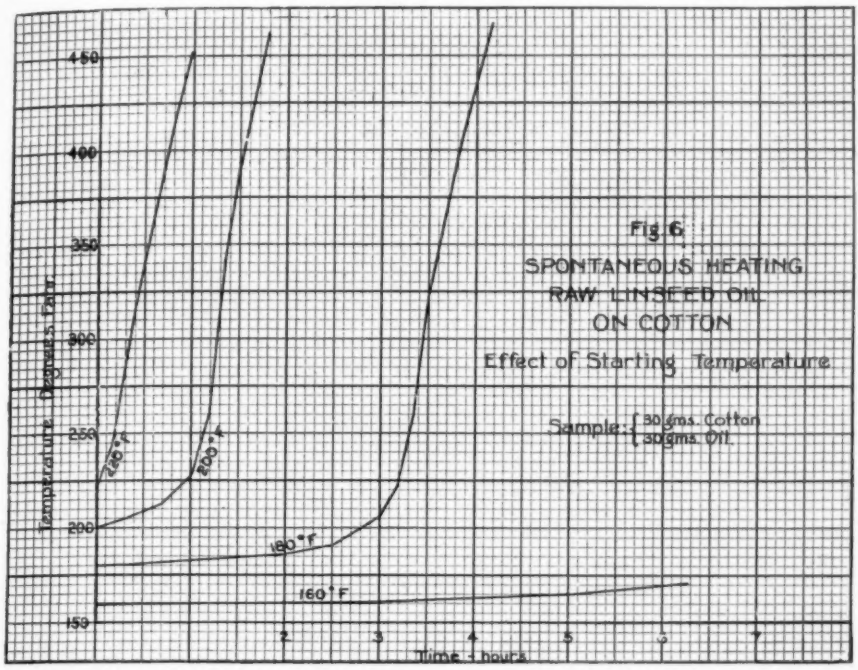

Fig. 6

50%. As the percentage of oil is increased the balance of heat losses by conduction and convection is changed and an increasing quantity of the heat evolved is required to bring about a given temperature rise in the sample itself. Furthermore, we found at very low oil percentages uneven distribution of the oil on the fibre with many individual fibres or sections thereof which were not entirely covered by an oil film,—and at high oil percentages oil films were formed so heavy that the ratio of surface exposed to weight of oil was less than the proportion most favorable for oxidation. From the data obtained, it seems reasonable to assume that the most rapid heating will be secured when the fibres are coated by the thinnest film of oil which can completely cover all their surface.

Tests (see Fig. 5) were made on four 30-gram samples of cotton waste, each carrying an equal weight of linseed oil:—one was thoroughly dried in the electric oven; another carried 6.7% water; another 10% water; and the fourth one 17% of water. When tested at 200°F., the time in hours to reach 225°F. were respectively,—1.13, 0.97, 0.66, and 0.65, The conclusion from these tests is that spontaneous heating is favored by increasing the humidity up to the point where the cotton is carrying approximately 10% water. The tests conducted on the oven-dried sample of cotton cannot be assumed to have run under conditions of absolute dryness because the air supply to the testing apparatus was of atmospheric humidity (around 50% relative). What would have hap-

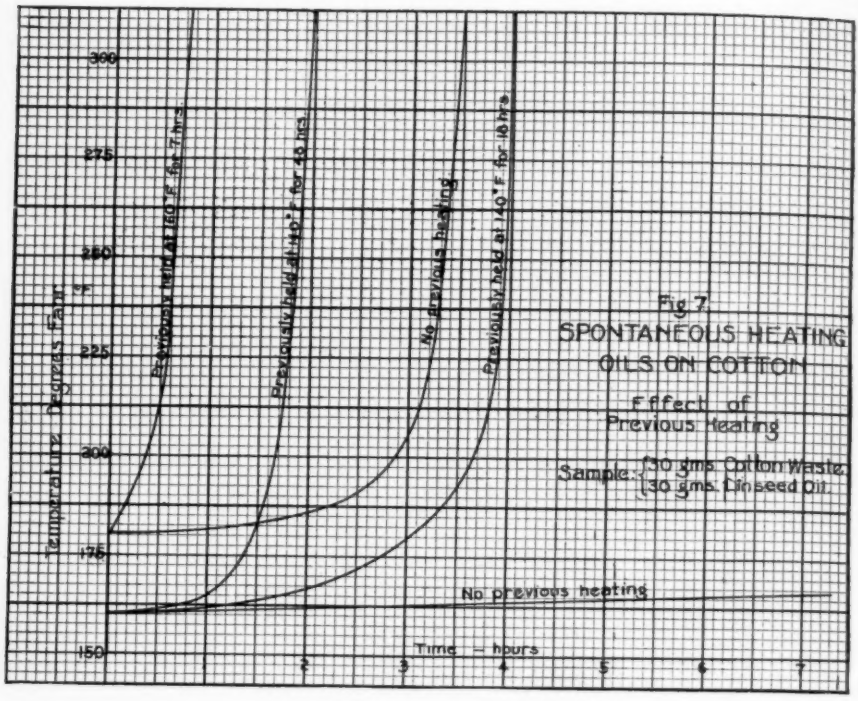
Temperature Degrees Fahr.
300
275
250
225
200
175
150
Previously held at 140° F. for 7 hrs.
Previously held at 140° F. for 45 hrs.
No previous heating
Previously held at 140° F. for 16 hrs.
No previous heating
Time — hours
2
3
4
5
6
7
Fig. 7
SPONTANEOUS HEATING
OILS ON COTTON
Effect of
Previous Heating
Sample: {30 gms. Cotton Waste
30 gms. Linseed Oil

Fig. 7

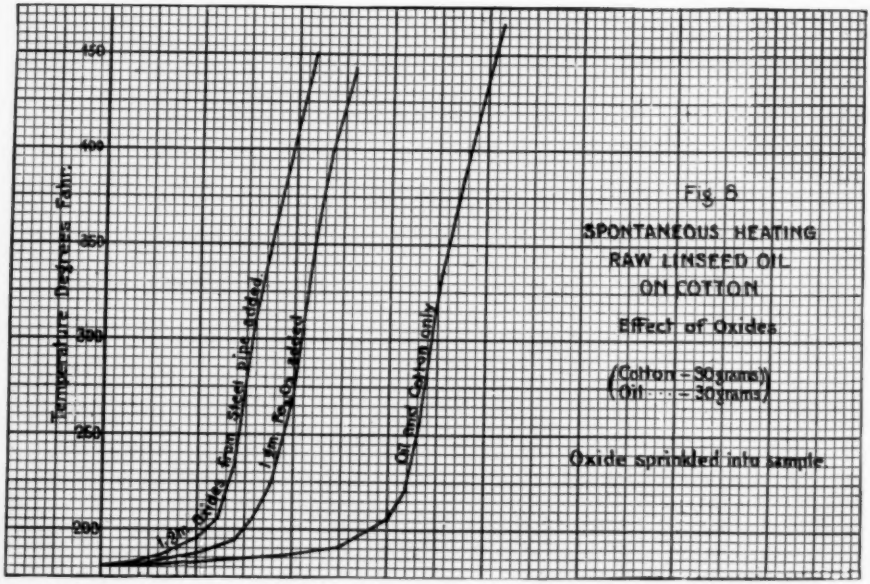
Temperature Degrees Fahr.
450
400
350
300
250
200
1.0% Oxides from blank added
1.0% Oxide added
Oil and Cotton only
Fig. 8
SPONTANEOUS HEATING
RAW LINSEED OIL
ON COTTON
Effect of Oxides
(Cotton = 30 grams)
(Oil = 30 grams)
Oxide sprinkled into sample

Fig. 8

pened if the test had been run in the absence of any moisture whatever is not indicated by these results and could not be determined without a change in the apparatus.

The next figure (No. 6) shows the effect of temperature on samples of cotton weighing thirty grams, each oiled with an equal weight of raw linseed oil. These samples were tested at 160, 180, 200, and 220°F. The heating rates

allowed to remain at room temperature over night. In the morning this sample was tested at 180°F., showing a much greater initial heating rate than a fresh sample would have at this same temperature. The rates in degrees per hour from 180 to 185°F. for the previously heated and fresh samples were 50.0 and 2.8, respectively. In a second set of tests, one sample was held at about 140°F. for forty-

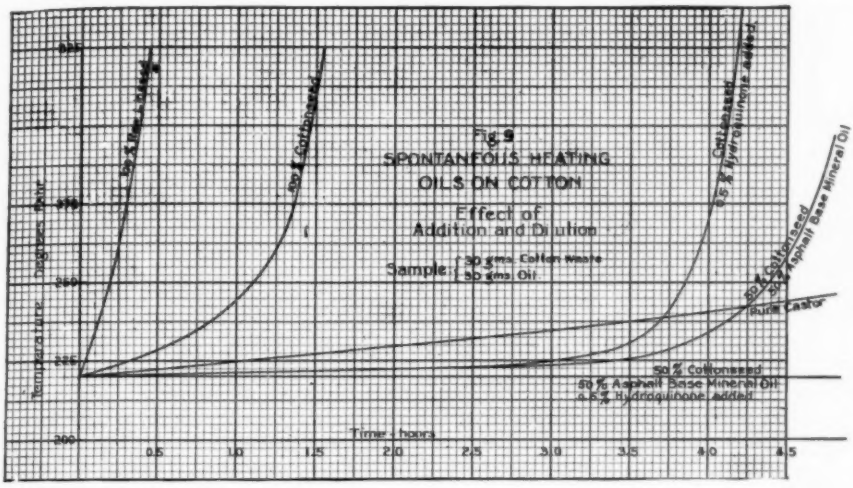

Fig. 9

in degrees Fahrenheit per hour for the first 5°F. rise were respectively 1.0, 2.8, 16.7 and 125. The results are expressed in this way because the tendency of any material to heat spontaneously at a given temperature is considered to be proportional to the rate of heating at or near the temperature in question.

Progressive Heating

It was observed that samples showed a greater heat evolution the longer they were maintained at or near any definite temperature (see Fig. 7). Accordingly, a sample of oiled cotton was held at 160°F. for seven hours, than cooled off and

eight hours and another at approximately the same temperature for eighteen hours. When these were tested in comparison with a fresh sample at 16°F., the rates observed for the first 5°F. rise were as follows:—

48 hrs. at 140°F. Sample—
Rate—10.0°F. per hour

18 hrs. at 140°F. Sample—
Rate—3.1°F. per hour

Fresh Sample
Rate—1.0°F. per hour

In order to find out whether any of this difference was due to a more complete absorption of oil by the individual fibres, a sample of cotton was oiled and allowed to re-

main at room temperature in an air-tight container for two weeks. When tested, however, it behaved like a fresh sample. The foregoing shows in a striking manner how spontaneous heating is accelerated by the products formed during the oxidation.

The next figure (No. 8) shows the effect of the presence of oxides, such as ordinary iron rust. Three samples were prepared, all of thirty grams of raw linseed oil on the same weight of cotton waste. One gram of powdered rouge was thoroughly worked into one of the samples. To another sample was added one gram of oxide artificially prepared by solution of a small piece of steel in dilute nitric acid with subsequent precipitation and drying. The third sample was untreated. Tests were all made at 180°F. The initial heating rates were, for oil and cotton only, 3°F. per hour; with rouge added, 5°F. per hour; and with the oxide prepared from steel added, 6°F. per hour. These results clearly show the increase in fire hazard when oily waste is used for wiping of rusty machinery or tools, or when allowed to come in contact with rusty steam pipes.

The next and last figure (No. 9) shows the effect of dilution of vegetable oil by the more inert mineral oil, and also the effect of an anti-catalyst.

The curves show that when cottonseed oil is diluted by an equal amount of the mineral oil, there is practically no oxidation evidenced for three or four hours, but that after this time the rate is almost as great as the straight cottonsed oil. Results somewhat similar are obtained by the addition of one-half of one per cent of hydroquinone. This addition serves merely to postpone the heating. At ordinary atmospheric temperature, however, either one of these additions might serve to slow down the oxidation of cottonseed oil so that no heating would ever be apparent. If we dilute cottonseed oil with an equal weight of mineral oil and then add to the mixture an anti-catalyst, no increase in temperature whatever can be observed from 220°F. even during the test extending over eight hours.

Conclusions Drawn

Going back again to the consideration of what represents the most desirable testing equipment, it is felt that the method which gives the most significant results is the one involving the maintenance of the small temperature difference between the sample and its surroundings. However, it is expensive to maintain this difference automatically; and if the regulation is secured manually, the method is somewhat laborious. The original Mackey method is not suitable for indication, except to show the hazard of very dangerous oils. By increasing the size of the sample to thirty grams, using clean cotton waste carrying an equal weight of oil, we were able to obtain more significant results with no more attention, even though the test time may be longer.

When testing oils for their tendency to heat spontaneously, it is necessary in every case to take into account the practical conditions under which the oil may be used. Even a pure castor oil will heat spontaneously to ignition temperatures under favorable conditions. When testing unknown samples, the spontaneous heating test should always be made in conjunction with a chemical analysis to determine the presence of agents which serve only to delay oxidation but which may not affect the final result.

May Standardize Barrels and Kegs

Simplification Expert Discusses Simplified Practice and Its Application to the Cooperage Industry.

SPEAKING before the Thirteenth Semi-Annual Convention of the Associated Cooperage Industries of America at Chicago, W. E. Braithwaite of the Division of Simplified Practice of the Department of Commerce, told of "Simplified Practice and Its Application to the Cooperage Industry." Mr. Braithwaite explained simplified practice as a method of eliminating the unnecessary varieties of commonplace articles, or concentration of production and sales of the "best sellers." In order to ascertain just what are the "best sellers," manufacturers, distributors and consumers meet in general conference, under the auspices of the Division of Simplified Practice of the Department of Commerce, and set up a simplified schedule, known as a Simplified Practice Recommendation.

To date, more than three hundred groups have requested the Division's cooperation in eliminating excessive varieties in their products. About one hundred industries have already worked out simplifications which have been accepted by the majority of the manufacturers, distributers and users concerned, by volume of annual production. Also, a large number of industries are now conducting variety surveys with the view of developing simplification programs.

Factual surveys of the benefits of simplified practice have brought estimates of savings in material, time, labor, and money which run high into the millions. Fully half of the industries which have adopted simplified practice find it difficult to interpret their benefits in terms of money as their efforts become lost in a maze of other factors. However, estimates of savings in money by some of the industries now producing on the simplified practice plan are as follows, for paving brick, $1,000,000; sheet steel, $2,400,000; steel reinforcing bars, $4,500,000; warehouse forms, $5,000,000; range boilers, $5,500,000; invoice forms $15,000,000; and lumber $200,000,000.

Dealing with simplification in the cooperage industry, Mr. Braithwaite said, "consideration of the general problem of how best to pack handle, transport, and distribute commodities after manufacture is engaging the attention of many industries. The question of containers is an important one and the solution of existing problems of diversified sizes, dimensions and capacities would, in the opinion of many, benefit not only the industry immediately concerned, but the carriers and all users of the commodity as well.

"In modern practice the packing of a product can scarcely be considered as separate from its manufacture. The engineering principles applied to the production of the commodity are just as necessary to the development of proper shipping containers, yet many whose products are the result of diligently applied engineering principles have given little consideration to this fact. Alert manufacturers, however, are giving more and more attention to shipping containers.

Careful study has convinced many that savings can be effected in efficient packing as well as in efficient manufacturing, and some concerns are showing profits by reducing packing costs while not able to reduce production costs.

"To give one example of the several simplifications of this type, a general conference of those interested in the production and use of box board convened in 1925 at the Department of Commerce to discuss a simplification program for that industry. A simplified practice recommendation was unanimously adopted reducing the list of thicknesses from 244 to 60. It was estimated at the time that this recommendation would mean a saving of about $5,000,000 a year to all concerned.

"Conferences and recommendations similar to this one, have been worked out for salt packages, preserve jars, jelly glasses, vegetable shortening, carriage and machine bolts, insecticide and fungicides, cut tacks and small cut nails, etc.

"A simplified practice recommendation is of doubtful value unless its existence and purpose are generally known, and being known, are used. By the processes of periodic re-survey and revision, it is possible to not only keep the respective recommendations thoroughly abreast of changing conditions, but also to measure the degree of adherence that is being accorded them. For example, nineteen of the effective simplifications which have been so measured show an average adherence of 79 per cent, Several of these programs run higher than 90 per cent adherence, while one goes as high as 99 per cent.

"Only the surface has been scratched. There are still more than a thousand opportunities for simplified practice."

Protest Soap Stock Rates

Swift & Co., Chicago, have complained to the Interstate Commerce Commission that the freight rates on carload shipments of cottonseed oil foots and other soap stock from its refineries in Houston and North Fort Worth, Tex., to Cincinnati, Ohio, are higher than the rates to Chicago. The Swift interests claim that in the Corporation Commission of Oklahoma case, the Commission intended that the rates be equal. The railroads refused to obey the ruling, and the Swift complaint seeks to compel them to obey it.

Gold Dust Merger Details

In the Gold Dust Corp. merger with the American Linseed Co., two and one-half shares of the recapitalized Gold Dust stock will be given for each share of Linseed common, and two and three-quarters new shares for each Linseed preferred share. Gold Dust voting trust certificates will be exchanged for two shares of the new stock. With the merger complete, there will be 3,000,000 no-par shares of the Gold Dust stock outstanding on an annual dividend basis of $2.50.

Bernard N. Glick Dies

It is with deep regret that we announce the death, on November 5th, at New York, of Mr. Bernard N. Glick, of Industrial Chemical Sales Company. Mr. Glick, who was well known as an authority on the uses and technical applications of activated carbons, had been connected with the Industrial Chemical Sales organization for the past fifteen years, was the manager of their technical department and a frequent contributor of scientific articles on activated carbons to this and other periodicals. He was born in England 38 years ago.

Metallic Soaps*

A Discussion of Occurrence, Uses and Properties

BY M. F. LAURO †

WE think of soaps as the alkali salts of the acids contained in fats. These acids in combination with glycerine occur naturally in vegetable and animal oils and fats, and when treated with caustic soda or potash become soaps in the common acceptance of the term, with liberation of glycerine as a by-product of the process we call saponification. We do not concern ourselves with the fatty acids of the same series of lower molecular weight, as acetic, formic, propionic, but with oleic, stearic, palmitic and lauric chiefly. With soda, potash and ammonia, their products are soluble in water, produce lather in abundance and are detersive in action.

However, there are other salts of the same acids, which are for the most part insoluble in water, do not lather and do not clean. They possess, however, properties that set them apart in a class by themselves, have acquired considerable commercial value in the past and are destined to play a greater role in the future. They are the soaps of the alkaline-earths and of the heavy metals, very interesting compounds of wonderful possibilities.

Metallic Soaps as Driers

Some of them have been in use for ages without the knowledge at first of their composition, only of some of their properties, learned of through accident rather than research. They are the siccatives or so-called driers of the paint and varnish industries. At first, the oxides, carbonates or inorganic salts of such metals as lead, cobalt and manganese were added to oils like linseed and tung to assist in their oxidation or drying. At ordinary temperature, these oils set too slowly for most purposes. Hence the use of boiled oils in paints. Later, the soaps themselves were prepared and added, as the linolenates, linoleates, resinates and 'tungates.' These soluble driers act as catalysts or oxygen carriers, permitting the entire body of the oil to dry in a few hours where formerly a day or two was required. It is found that those salts are the most effective whose metals form lower and higher oxides, which is in accord with the theory of catalysts propounded. On this subject an extensive literature and research have grown up. It is, therefore, needless to go further into the application of metallic soaps to the paint and varnish industry, as being too familiar and comprehensive a subject to discuss here.

A description of the manifold uses to which metallic soaps are put show to what extent they have already established their importance; and wherever I can, I shall indicate the places where they may apply to further advantage or point out possible uses for the future.

The zinc, iron, nickel, cobalt and chromium soaps are used for waterproofing leather and canvas and in coloring varnishes. The aluminum and magnesium soaps go to waterproofing textile goods. Aluminum

*Presented at the Second Fall Meeting, American Oil Chemists Society.

†*New York Produce Exchange Laboratory.*

soaps are especially important, finding extensive employment in the waterproof sizing of papers, in substitutes for leather, in celluloid, rubber and insulating materials, in mordanting, in oil-emulsions like oil-dag, solidified oils or solid lubricants, floor waxing compounds, polishing preparations, etc. The oleate is particularly useful as an oil thickener.

Pharmaceutical Uses

In the pharmaceutical line, the mercury, lead and zinc compounds have long been known, chiefly as ointments and plasters. The strontium soap of dibromobehenic acid is a substitute for potassium bromide. Zinc stearate is familiar to you as a facial or dusting powder for the skin. Lead oleate has great antiquity, having been known to Dioscorides, the Greek physician and authority on Materia Medica. Copper oleate is used in granulation and in ulcers. The soaps of pharmacy are prepared by trituration of lard or suet, or of oleic acid, with the oxides of the metals and therefore are chiefly mixtures of the consistency of pastes or ointments. The pure soaps themselves, however, are beginning to find a field of their own in the dry state. The saturated fatty acid salts of mercury should find use as antiseptic and germicidal dusting powders for wounds, without the toxic effects of the usual mercury compounds. Iron soaps may replace to advantage in pill or in emulsion form the various preparations of peptized iron for internal use. Silver soaps, likewise, may be substituted for preparations like argyrol that stain or for the cauterizing of raw surfaces in place of the caustic nitrate or in lieu of the silver caseins, proteins or vitellins. Research along these lines should reveal an astonishing number of places where the soaps may be employed dry, or emulsified and incorporated with other ingredients.

Copper and mercury soaps are useful in fungicide sprays for trees and plants, in disinfectants and in anti-fouling paints. The latter applied to ship-bottoms prevent the growth of barnacles by their poisoning action, or protect the metal from corrosion by causing these parasites to slip off of their own weight. Small amounts, added to the usual alkali soaps, are employed as antiseptics.

In wool scouring, lime is at times thrown into the waste suds to settle out the fat with the insoluble soap formed. Salts of magnesium and iron are likewise used to carry down the fatty acids as soaps together with the neutral portions of the wool fat. The mass is subsequently extracted with acetone or preferably the higher ketones, dissolving out the neutral fat for further refining to the final lanolin of the drug trade.

Dry-cleaning Applications

Metallic soaps are going to be used considerably more in the dry-cleaning line. At present magnesium oleate in petroleum benzine is added to the solvents of the dry cleaner to prevent spontaneous firing from the static electricity generated by the withdrawal of silk goods from the bath. In my own experiments, I have found that a few metallic soaps—nickel for example—in benzol or certain of the lacquer solvents, will produce good lathering and detergent effects. They are, therefore, of possible use in the cleaning of such fabrics as are injured by water soluble alkali soaps—as in the cleaning of silk and chamois.

Occurrence in Oils

Of frequent occurrence are the lime and iron soaps in our own oil

industries, though fortunately seldom to the extent of causing serious annoyance. Yet at such times, their formation accidental or incidental to manufacturing processes, forced desired attention to their presenec, their properties and the means of their removal. Otherwise we would never know about them. In olive oil foots, for example, lime soaps occasionally occur in sufficient amount to warrant rejection of shipments. Being soluble in carbon bisulphide or warm ether, the soaps pass through the filtration media concealing their presence on the usual form of analysis for moisture and impurities and soap color required by the trade. The appearance of the foots reveal large amounts by their sliminess, pastiness or semi-solidity when they should be practically liquid. As a rule, foots show normally only a bare trace of lime, giving on ignition one tenth or two tenths of one per cent of ash, which should be practically all iron oxide. Abnormal content of lime soap arises possibly from the use of lime oxide or carbonate in the last pressing of the olive marc to reduce the acidity of the commercial oil obtained, and the subsequent carbon bisulphide extraction of the residue for sulphur oil or foots; the lime soaps produced dissolving and remaining in the oil.

Tanks, drums, pipelines, etc. will furnish under careless conditions the rust to combine with oil to produce iron soaps that darken the color of oils, at times sufficiently to affect acceptance of delivery. With favoring conditions of high temperature, moisture and long contact even with low acid oils, the oxides become suspended in the oil partly mechanically, partly colloidally, and there is partial solution as soap as well. In the latter case, we say that the color of the oil has been fastened. Filtration will, therefore, not lighten the color in the severe case. Partial saponification with soda ash or lye will remove this, as will the use of hydrochloric, oxalic or phosphoric acids. In our laboratory, we have had a few shipments of palm-kernel oil, sold on color as one consideration, thus darkened by iron soaps. It is surprising what an insignificant amount of iron soap will do to discolor an oil. I have had a few instances of edible olive oil also darkened by iron in solution, through the use of inferior drums. On long standing, the oil clarified somewhat because of the settling of iron oxides, originally in such a fine state of suspension as to be invisible, but the soap in solution rendered the oil too dark for other than technical purposes unless capable of being treated by harmless methods.

Lime soaps are also to be found in inedible tallows and greases, and we as chemists determine their amount as soluble impurities by ignition, and calculation of the ash back to the soap basis.

Metallic Soaps as Emulsifiers

In the hydrogenation of oils, small amounts of nickel soaps are formed from the reaction involved at high temperature. It has been suggested to use nickel soaps, and also mixtures of nickel and iron or copper soaps of fatty acids as catalytic agents to promote intimate contact between catalyst and oil in this process.

One of the most important properties of soap is its ability to form emulsions. The alkali soaps have been used extensively for such. Of the insoluble soaps, lime and aluminum are thus chiefly employed. The textile industry draws on the former for softening agents, the petroleum industry on the latter type for lubricants. I have found that ordi-

nary soda soap will emulsify its weight or over of free stearic acid to which water can be added in large amount, and the resulting product will stand up as a silky paste, 'gel' or emulsion according to the dilution. This emulsion is quite durable and fails to break under severe conditions.

The usual emulsions are of oil dispersed in water with a small amount of water-soluble soap to keep the globules of oil from coalescing. With metallic soaps, we may reverse the procedure and disperse water in oil. Solidified oils, solid lubricants and cutting compounds may thus be formed.

I remember in connection with lubrication, the solicitude with which a petroleum oil was once examined for saponifiable matter, because it was then believed that animal or vegetable fats present in such an oil would cause gumming under friction, and the acid present or produced by hydrolysis would corrode bearings and the metallic parts of contact. Research into what constitutes the 'oiliness' of oils, whereby they lubricate, has evolved the so-called 'germ' process in lubrication, based on studies of capillarity and surface tension. It is no longer thought that a saponifiable fat is objectionable, but on the contrary it is held advantageous. So now, we incorporate fatty compounds or better still, smaller amounts of fatty acids in proper proportions for the various types of lubricants, as steam turbine, cylinder, cup, etc. These help to spread the oil into minute places and wet surfaces that were not so efficiently reached before. It was a known though peculiar fact that the fatty oils were better lubricants in general that the mineral oils, though why was then unknown.

To overcome the objection that still persists to a small degree of the corrosive and gumming effects of saponifiable fats, even with the increased lubrication that now results from their inclusion, metallic soaps may be substituted in part or entirety for the fats. As emulsions with mineral oils, they maintain continuous and permanent films, wetting the surfaces of contact and spreading better, due to the decreased interfacial tension between oil and metal because of their presence. Hence, I look for a greater future for the metallic soaps in lubricants.

To the analyst, encumbered with the conventional tests of an undecisive nature due to the ingenuity with which adulteration and admixture are now practiced, the use of metallic soaps in his work should come as a godsend. The tearing down of oils into their constituent fatty acids and the determination of their ultimate composition are his final and almost inevitable resort; for no longer do iodine values, etc., give him the substantial evidence needed to adjudge an oil. By preparing the metallic soaps of the mixed acids and separating them by the appropriate solvents, he is in a fair position to prove adulteration and put the oil bootlegger in a tighter position than his relative of another line.

Develop New Chlorophyll

The firm of Dr. F. Wilhelmi, Taucha Bez, Leipzig, Germany, has succeeded in producing a water soluble powdered Chlorophyll which is now being manufactured commercially. In this form, the chlorophyll is said to be three times as strong as is the usual paste form now in general use in the oil and allied industries.

Detoxicated Cottonseed Meal

A New Process of Treating Meal and the Results of Some Feeding Experiments

BY PAUL MENAUL

SINCE the author's[1,2] earlier contributions to the nature of the toxic substance inherent in cottonseed meal, a method for detoxicating cottonseed meal has been evolved and its value as a protein concentrate determined under actual farm feeding conditions.

Heretofore the use of cottonseed meal has been limited and attended with danger on account of the poison, gossypol, which according to Clark[3] is ten to twenty times as poisonous as white arsenic.

The gossypol isolated by other workers has been prepared by precipitating with aniline or acetic acid, with subsequent hydrolysis. It has been assumed that this yields the pure compound as it exists in the cottonseed, but this does not necessarily follow. A reactive molecule may suffer an intramolecular rearrangement or a change in composition, likewise there may be some other reactive compound associated with it in the poison glands of the cottonseed, which the aniline does not precipitate. In order to obtain this substance of the poison glands in as near as possible its original state, the author employed the method of extraction with immiscible solvents. The gossypol was extracted from the cottonseed with sulfuric ether, the resulting solution concentrated by evaporation, then the gossypol precipitated by petrolic ether; the precipitated substance washed with petrolic ether, redissolved in sulfuric ether, reprecipitated by petrolic ether, and this procedure repeated five times. This should yield the contents of the poison glands in a pure and original state.

Gossypol prepared by this method was found to be far more reactive chemically than that prepared by other workers. This preparation decomposed when heated to 100° C into water and an insoluble reddish brown caramel, (that described in the literature has a melting point of 187° C). This decomposition of the gossypol does not take place, however, unless the gossypol has been removed from the poison glands, i. e. exposed to air, neither does this decomposition occur when gossypol dissolved in cottonseed oil is heated to 100° C.

Using this new information it seemed logical that the gossypol could be decomposed in the meal, if it could be caused to exude to the outside of the meal granules, then heated above 100° C. The method employed comprises raising the moisture content of the meal to about forty percent, then heating above 100° C, preferably with steam under pressure. The moisture and the high temperature cause a swelling of the meal tissue, forcing the gossypol to exude from the poison glands or pockets to the outside of the meal granules where it readily decomposes. The meal has then a dark reddish brown color, the color of the harmless decomposition product of gossypol, and all tests have proven it perfectly non-toxic, even to young chicks, which are especially suspectible to gossypol poisoning. The decomposition of the

gossypol may not be 100% but feeding trials covering the last three years have failed to disclose a trace of toxicity, even among young animals receiving a ration containing as much as thirty percent non-toxic cottonseed meal, over long feeding periods.

Strange as it may seem, chicks raised from hatching to maturity on a ration containing a high percentage of non-toxic cottonseed meal showed a remarkable increase in size over the parent flock which was raised on other balanced mixed feeds.

A small experimental mill for detoxicating cottonseed meal was erected at Chickasha, Okla., and the results of feeding this product by prominent farmers under actual farm conditions are reported by the Feed Department of the Chickasha Cotton Oil Co. The following is a condensed summary of this report.

We found first of all that this non-toxic cottonseed meal can be fed safely to young chickens, calves and pigs in amounts which would constitute a safe protein content in a balanced ration. Baby chicks fed a ration consisting of one third non-toxic cottonseed meal, the other two thirds being corn meal, chops, bran, etc., showed unusual growth, almost no loss. These chicks were as large at six weeks of age as others were at eight weeks on other rations. Non-toxic cottonseed meal was substituted for meat scrap in feeding a flock of 5,000 hens, and the owner writes us that he has gotten an increased egg production at lower cost. As a result of another feeding trial using the non-toxic meal in feeding a flock of registered chickens, the owner informs us that he has gotten better results with this ration than with any other he has ever used. The chickens in one generation show an increase in size over the parent flock which was raised on other rations. One feeder using this non-toxic meal in his hog ration reports that it is highly satisfactory and claims that he can produce pork more cheaply by its use than by the use of any other form of protein that he can buy. In the local feed pen a year ago, 200 head of yearling white faced steers fed a ration of non-toxic meal and hulls with corn chops added during the last 40 days made a much better gain in weight at a lower cost and sold for $1. per cwt. more on the market than a similar pen of the same cattle fed the regular cottonseed meal with corn ration.

In another feeding trial this past season, steers fed this non-toxic meal made the same gain in weight as similar steers fed the same amount of commercial meal plus about two pounds of a mixed feed steer fattener per day, and those fed the non-toxic meal sold for 50c more per cwt. on the market. Two hundred baby calves averaging 250 to 275 pounds each were successfully fed this non-toxic meal from 3 up to 4 pounds per day with kafir chops and hulls for 130 days. The packers who bought them commented on the fine quality of the meat. In all cases the non-toxic meal produced a better quality of meat than the commercial meal. This was noticed especially in the cattle, which the packers graded as corn-alfalfa fed. In summing up what has been done to date, we are led to believe that this process does away with the toxicity in cottonseed meal. The feeding reports show that the protein of cottonseed meal has unusual growth promoting qualities.

Heretofore rations containing cottonseed meal have been supplemented with expensive protein con-

centrates such as linseed meal or meat scrap and much care taken that the percentage of cottonseed meal did not approach the 'threshold of toxicity.'

From these feeding reports it seems conclusive that cottonseed meal, the cheapest of all sources of protein, can be prepared in a non-toxic condition and that this product can be combined as the sole protein supplement with any economical grain and roughage for the production of a balanced feedstuff.

It is known that the protein of cottonseed meal is especially rich in the essential amino acids, i. e., it approximates the theoretically complete protein.

[1] Menaul, Paul. 1922, Poisonous Substance in Cottonseed. Proc. Okla. Acad. of Sci. University of Oklahoma Bulletin N. S. No. 247, p. 68-70.

[2] Menaul, Paul. 1923. The Physiological Effect of Gossypol. Journal of Agricultural Research. Vol. XXVI, No. 5, p. 233-237.

[3] Clark, E. P. 1927, Cotton Oil Press, June, p. 49.

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The American Oil Chemists' Society

Notes and Correspondence

Progress Report of the Kreis Test Committee of the American Oil Chemists' Society

To date the experimental work of the committee has been concerned with the reproducibility of the Kreis Test. A procedure, based essentially upon that described by Kerr, *Journal of Industrial & Engineering Chemistry* 10, 471-5 (1918), was adopted for trial and the various factors which might affect its reproductibility have been studied. Three of the nine committee members have made reports on this work and all agree that the procedure does give a reproducible result.

If this procedure is accepted as standard for the committee's use, further work is planned along the following lines:

1. Standardization of the method of reporting results as well as the procedure itself, so that intensity of the Kreis Test can be reported in a quantitative way.

2. Application of the standardized test to one or more series of samples of the same type of fat or oil and comparison of the relative results of the Kreis Test with the relative degree of rancidity as judged from flavor and odor at time of making the test.

3. Comparison of the intensity of Kreis Test of a series of samples with the degree of rancidity which develops in the samples stored under uniform conditions after the time of making the Kreis Test.

By means of the above program, it is hoped that the task assigned to the committee can be accomplished, namely, to determine if the Kreis Test is of value as an index to the degree of rancidity of a fat.

A. S. RICHARDSON,
Chairman.

Mr. A. W. Putland, President of the American Oil Chemists' Society, desires to advise members of the Society and others who have had Lovibond color glasses standardized by the U. S. Bureau of Standards that the new values assigned by the Bureau should be used as soon as the laboratories receive them. Each old value should be disregarded as soon as the glass has been assigned a new value.

Potash 161 Years Ago

EXTRACT FROM "THE LONDON CHRONICLE"

Friday, February 20, 1767

"ON Wednesday, the Society of Arts, Manufactures, and Commerce confirmed the following resolution: That the gold medal of this Society be presented to Mr. Dossie, in consideration of the pains and skill bestowed by him in drawing up, at the request of the Society, in the year, 1761, the processes for making potash and barilla in America, which appears to have been one great means of the establishment of that article in our colonies; and likewise of the further trouble which he has taken, at the desire of the Society, in making experiments on the samples of potash sent by them to him, and giving in writing an ingenious and useful account of the same together with instructions for judging of the comparative value, and discovering the sophistications of potash, which he has given liberty to the Society to print for the use of the Colonies."